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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,940	02/20/2004	Ju-Jin An	8054-26 (AW8120US/JY)	4785

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EXAMINER	
DEO, DUY VU NGUYEN	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 05/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/783,940	AN ET AL.	
	Examiner	Art Unit	
	DuyVu n. Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7-9, 14, 15, 17, 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and Iyer et al. (6,383,723).

Admitted prior art describes a method for etching a conductive film, such as polysilicon, metal, and metal compounds, comprising: forming an insulating oxide layer on a substrate, forming a conductive film on the insulating oxide layer, forming an ARC film, such as silicon oxide, nitride, and silicon oxynitride, on the conductive film, forming a photoresist pattern on the ARC film, patterning the conductive film using the photoresist pattern (specification, pages 1-3). Unlike claimed invention, admitted prior art doesn't suggest cleaning the ARC film using a first and second cleaning solutions. Iyer describes a method for etching substrate wherein he teaches cleaning the ARC film, including silicon oxide, nitride, and oxynitride, by a first sulfuric acid solution and a second DI water (claimed second solution) (col. 3, line 10-20, line 30-col. 4, line 8) before applying the photoresist on the ARC film. It would have been obvious for one skilled in the art at the time of the invention to modify admitted prior art in light of Iyer's teaching of cleaning the ARC film because he teaches that by cleaning the ARC film before forming the photoresist would reduce the defects such as resist footing and T-topping (ab.; col. 3, line 55-65). These cleaning solutions would clean oxide residues on the ARC film.

Referring to claims 2 and 25, admitted prior art describes the oxide residues are generated form a purge gas containing nitrogen oxide (page 3 of the specification).

Referring to claims 5 and 15, Iyer describes the first sulfuric cleaning is done at T 70-150 degree Celsius and for about 5-50 mins (col. 4, line 9-17).

Referring to claims 7, 17, and 26, even though Iyer doesn't describe the second cleaning step, DI water rinsing, is performed at a T 30-70 degrees Celsius for about 5-15 mins; however, one skilled in the art would find it obvious to determine the T and time of the DI water rinsing through routine experimentation in order to clean the wafer with a reasonable expectation of success.

Referring to claim 8, even though applied prior art doesn't describe the first and second cleaning process are done in-situ; however, this is a cleaning process, one skilled in the art would find it obvious to do these cleanings in-situ because it would eliminate the transferring step, if not done in-situ, which can cause airborne contamination of the substrate during the transferring step.

Referring to claim 24, the steps for forming a volatile memory cell, including forming a transistor and a pad, forming a contact hole through an insulating layer and a an ARC layer to the pad and forming a contact plug in the contact hole are known to one skilled in the art (please see page 2 of the specification and Nesbit et al. (US 6,686,668) cited below).

3. Claims 18, 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (US 6,159,860).

Yang describes a method for forming a semiconductor memory gate comprising: forming a tuner oxide 15 on a substrate, forming a first conductive poly 1 on the tunnel oxide film;

forming a ONO film on the poly 1; forming a second poly 2 on the ONO film; forming a WSix on the second poly 2; forming a SiON (claimed hardmask) on the WSix; forming a photoresist pattern on the hardmask; patterning the hardmask using the photoresist and patterning the WSix, the second poly 2, the ONO and the first conductive poly 1 using the hardmask (fig. 4; col. 4, line 40-col. 5). Unlike claimed invention, Yang doesn't suggest cleaning the ARC film using a first and second cleaning solutions. Iyer describes a method for etching substrate wherein he teaches cleaning the ARC film, including silicon oxide, nitride, and oxynitride, by a first sulfuric acid solution and a second DI water (claimed second solution) (col. 3, line 10-20, line 30-col. 4, line 8) before applying the photoresist on the ARC film. It would have been obvious for one skilled in the art at the time of the invention to modify Yang in light of Iyer's teaching of cleaning the ARC film because he teaches that by cleaning the ARC film before forming the photoresist would reduce the defects such as resist footing and T-topping (ab.; col. 3, line 55-65). These cleaning solutions would clean oxide residues on the ARC film.

Referring to claim 22, Iyer describes the first sulfuric cleaning is done at T 70-150 degree Celsius and for about 5-50 mins (col. 4, line 9-17).

Referring to claim 23, even though Iyer doesn't describe the second cleaning step, DI water rinsing, is performed at a T 30-70 degrees Celsius for about 5-15 mins; however, one skilled in the art would find it obvious to determine the T and time of the DI water rinsing through routine experimentation in order to clean the wafer with a reasonable expectation of success.

4. Claims 6, 16, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art/Iyer or Yang/Iyer as applied to claims 1, 9 and 24 above, and further in view of Schulz (US 5,637,151).

Referring to claims 6, 16, and 27, applied prior art above doesn't suggest the second cleaning solution includes SC 1. Schulz describes a method for cleaning substrate including a sulfuric cleaning solution and a SC 1 cleaning solution afterward (figs 1 and 2). It would have been obvious for one skilled in the art at the time of the invention to modify applied prior art in light of Schuz's teaching of using SC 1 because it would improve remove particles from the surface of the wafers (col. 1, line 44-49; col. 2, line 1-5; ab.).

5. Claims 10-13, 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art/Iyer or Yang/Iyer as applied to claims 9 and 18 above, and further in view of Okoroanyanwu et al. (US 6,753,247).

Applied prior art above doesn't describe the ARC film comprises a 1st ARC, an oxide film on the 1st ARC, and a 2nd ARC on the oxide. Okoroanyanwu describes a method for forming a memory cell using an ARC film that can have one or more layers of oxide, nitride, and oxynitride (col. 9, line 25-55). One skilled in the art would find it obvious at the time of the invention to use a multi-ARC film in light of Okoroanyanwu's teaching because he teaches that one or more films can be used depending on the desired optical antireflective properties (col. 9, line 35-38).

Referring to claims 13 and 20, Okoroanyanwu further teaches that the ARC layer can be formed to any suitable thickness to facilitate achieving desired objectives and performance criteria (col. 9, line 50-55). Therefore, one skilled in the art would find it obvious to determine

the thickness of the ARC materials through routine experimentation in order to provide an optimum thickness for the ARC layer with a reasonable expectation of success.

Nesbit et al. is cited to show prior art (figs. 7-11).

Response to Arguments

6. Applicant's arguments filed 2/14/06 have been fully considered but they are not persuasive.

In response to applicant's argument that Iyer does not render cleaning oxide residues on an anti-reflective layer using a first solution, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Applicant has not provide facts to show that Iyer's first and cleaning solution would not remove oxide residues from the anti-reflective layer. Iyer teaches using sulfuric acid that is the same as of claimed invention. Therefore, his solution would also remove any oxide residues on the anti-reflective layer.

Applicant argument's that there is no motivation to combine APA with Iyer because Iyer's problem or defects to be corrected is not the same as APA is found unpersuasive. The defects maybe different; however, it is the defects on the same layer, which is still needed to be corrected. One skilled in the art would still find it obvious to use Iyer's teaching to clean the anti-reflective layer.

Applicant's argument that claimed range of temperature, 30-70 degree C, is lower than that of the prior art range, 70-150 degree C is found unpersuasive because the range provides that

any temperature within that range will work and since the process is done at one value of temperature but not at the whole range of temperature. A temperature of 70 degree C, which is taught by Iyer, is within that range. Therefore, Iyer does teach the temperature that is within and read on claimed range.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6 am -2:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner
Duy-Vu N Deo
4/27/06